(7 pages) **Reg. No. :**.....

Code No. : 20368 E **Sub. Code : EMCH 11/ FCCH 11**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2025.

First Semester

Chemistry — Core

GENERAL CHEMISTRY – I

(For those who joined in July 2023 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Moseley's experiment involved the study of which of the following?
   (a) Gamma rays
   (b) Alpha particles
   (c) X-rays
   (d) Beta particles

2. According to Pauli's Exclusion Principle, how many electrons can occupy a single orbital?
   (a) 1 (b) 2
   (c) 3 (d) 4

3. The square of the wave function Ψ^2 in the wave mechanical model represents ————.
   (a) Energy of the electron
   (b) Spin of the electron
   (c) Probability density of finding an electron
   (d) Charge of the electron

4. Which of the following ions has the smallest ionic radius?
   (a) Cl^- (b) F^-
   (c) O^{2-} (d) N^{3-}

5. The Lewis dot structure of an atom represents
   (a) The arrangement of valence electrons around the atom
   (b) The number of protons in the nucleus
   (c) The arrangement of electrons in orbitals
   (d) The total number of neutrons in the atom

6. The molecule with the highest bond angle is _____.

(a) CH_4 (b) NH_3

(c) H_2O (d) $BeCl_2$

7. When BF_3 interacts with NH_3, what type of bond is formed between them?

(a) Coordinate Bond

(b) Pi Bond

(c) Sigma Bond

(d) Ionic Bond

8. Which of the following materials is a typical example of a semiconductor?

(a) Copper (b) Gold

(c) Iron (d) Silicon

9. The inductive effect is a

(a) Temporary effect

(b) Permanent effect

(c) Resonance effect

(d) Transient effect

10. Which of the following substituents will increase the acidity of phenol?

(a) $-NO_2$ (b) $-CH_3$

(c) $-OH$ (d) $-NH_2$

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain Planck's quantum theory.

Or

(b) Write a note on Heisenberg's uncertainty principle.

12. (a) Describe the postulates of quantum mechanics.

Or

(b) Describe about classification of elements in the periodic table.

13. (a) Write a note on properties of ionic compounds.

Or

(b) Write a note on orbital overlap in σ and π bond formation.

14. (a) Draw and explain the M.O diagram of carbon molecule.

Or

(b) Illustrate the types of hydrogen bonding with example.

15. (a) Write a short note on homolytic and heterolytic cleavage.

Or

(b) Describe the addition reaction with suitable examples.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the Bohr atomic model.

Or

(b) Write a note on :

(i) Hund's rule

(ii) De-Broglie's equation.

17. (a) Write a note on :

(i) Schrodinger wave equation

(ii) Covalent radii. (5 + 3)

Or

(b) Explain the following :

(i) Differentiate between Bohr orbit and orbital

(ii) Electro negativity. (4 + 4)

18. (a) Describe the Born-Haber cycle and explain how it is used to calculate the lattice energy of an ionic compound.

Or

(b) Explain VSEPR theory and explain the shapes of molecules of the type AB_3 and AB_4.

19. (a) Bring out the difference between valence bond theory and molecular orbital theory.

Or

(b) Explain about n-type and p-type semi conductor.

20. (a) Illustrate the formation of reactive intermediate carbocation and nitrenes.

Or

(b) Explain the following :

(i) Inductive effect

(ii) Hyperconjugative effect.
